Docket No.: 21581-00271-US
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Yoshiki Nakagawa, et al.

Application No.: 09/870,397

Filed: May 31, 2001 Art Unit: 1712

For: FUNCTIONAL GROUPS-TERMINATED VINYL POLYMERS Examiner: M. Moore

DECLARATION UNDER 37 CFR 1.131

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Yoshiki Nakagawa, Kenichi Kitano, and Masato Kusakabe declare that we are the inventors who on July 28, 1998, filed U.S. patent application SN 09/122,896, which is the parent of the above-identified U.S. patent application, and that they made their invention in Japan prior to February 6, 1997.

We further state that prior to February 6, 1997, the present invention was reduced to practice in Japan by us and/or under our direction and/or supervision. In particular, a vinyl polymer having at least one terminal functional group per molecule and a ratio of weight average molecular weight to number average molecular weight of less than 1.8 as determined by gel permeation chromatography, wherein the terminal functional group is a crosslinking silyl group of the general formula (1) shown below,

$$-\{Si(R^1)_{2-b}(Y)_bO\}_m-S_1(R^2)_{3-a}(Y)_a \qquad (1)$$

wherein R^1 and R^2 each independently represents an alkyl group containing 1 to 20 carbon atoms, an aryl group containing 6 to 20 carbon atoms, an aralkyl group containing 7 to 20 carbon atoms, or a triorganosiloxy group of the formula $(R')_3SiO-$, R' being a monovalent hydrocarbon residue containing 1 to 20 carbon atoms and the three R' groups being the same or different,

provided that when a plurality of R^1 or R^2 groups occur, they may be the same or different; Y represents a hydroxyl group or a hydrolyzable group, provided that when a plurality of Y groups occur, they may be the same or different; a represents 0, 1, 2 or 3, b represents 0, 1 or 2, and m represents an integer of 0 to 19, provided that the condition $a + mb \geq 1$ should be satisfied, was reduced to practice by us and/or under our direction and/or supervision in Japan, prior to February 6, 1997.

This is evidenced by the attached Exhibit A which is a true copy of laboratory note page 51 with the dates being redacted which shows a reduction to practice of the present invention and namely, example 7 of the present application. The silyl-terminated polymer of the note page has a M_w/M_n of 1.74. The laboratory note page 51 was created prior to February 6, 1997 and all of the dates redacted from Exhibit A are prior to February 6, 1997.

The undersigned declare further, that all statements made in this declaration of their own knowledge are true and that all statements made on information and belief are believed to be true; and that willful, false statements and the like, so made, are punishable by fine and imprisonment, or both, under section 1001 of Title 18 of the United States Code and that such willful, false statements may jeopardize the validity of the application or any patent issuing thereon.

Date:_____ Signature:_____

Yoshiki Nakagawa

Date:_____ Signature:_____

Kenichi Kitano

Date:_____ Signature:_____

Masato Kusakabe

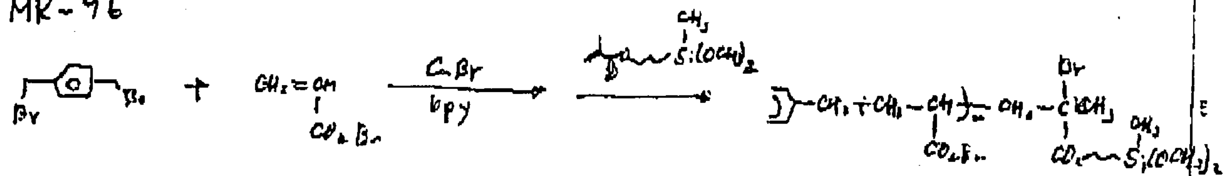
EXHIBIT A

Notebook No.: Date 年 月 日

Project: Telechelic Acrylic Oligomer | Subject: Synthesis of alkoxysilyl group-containing BA oligomer by ATRP process

From Page No.

MK-96



Concept

In the experiment MK-19, the introduction of trimethoxysilyl group was attempted. However, the obtained oligomer was cross-linked during the removal of the solvent and, then the oligomer could not be isolated. Trialkoxysilyl group may be too reactive and the curing reaction proceeded in the absence of catalyst. In this experiment, ~~[struck out]~~ the introduction of less-reactive dialkoxysilyl group is tried.

Materials

butyl acrylate (5 mL, 4.47 g, 34.9 mmol)

Br-(C6H4)-Br (185 mg, 0.70 mmol)

CuBr (100 mg, 0.70 mmol)

bpy (217 mg, 1.40 mmol)

allyl-Si(CH3)(OMe)2 (652 mg, ~~[struck out]~~ 2.80 mmol)

① The above mixture was degassed by bubbling N_2 for 15 min

② Polymerization of BA: 130°C × 2 hrs

The reaction with allyl-Si(CH3)(OMe)2 : 100°C × 2 hrs

③ After filtration of insoluble materials, the organic layer was washed with aq NH_4Cl, brine, and dried over Na_2SO_4

- Yield 4.75 g (90%)
- GPC Mn = 7100, Mw/Mn = 1.74
- Curing Test { oligomer 2.11 g; U-220 63.3 mg (3 phr) } r.t. × 4 days ⇒ 55%; r.t. × 7 days ⇒ 58%

To Page No.

(日付) Date (記入) (日付) Date

Understood and Witnessed by

発明者 Invented by Masato Kusakabe

Signed [signature]